Simultaneous Analysis of Cypermethrin and Fenvalerate Residues in Tomato after Field Treatment by Gas Chromatography

By

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List of abbreviations

AD	Anno Domini
ASE	Accelerated Solvent Extraction
BC	Before Christ
Class I	Most Toxic
Class IV	Least Toxic
ECD	Electron Capture Detector
ELCD	Electrolytic Conductivity Detector
Envi-Carb	Environmental Carbon
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FPD	Flame Photometric Detector
FTD	Flame Thermionic Detector
GC	Gas Chromatography
GCB	Graphitized Carbon Black
GPC	Gel Permeation Chromatography
HPLC	High Performance Liquid Chromatography
IUPAC	International Union of Pure and Applied Chemists
LOD	Limit Of Detection
LOQ	Limit Of Quantification
MAE	Microwave Assisted Extraction
MDE	Macro Porous Diatomaceous Earth
MRLs	Maximum Residue Limits
MRM	Multiresidue Multiclass Method
MS	Mass Spectrometer
MSPD	Matrix Solid Phase Dispersion
NPD	Nitrogen Phosphorus Detector
PFE	Pressurized Fluid Extraction
PSA	Primary Secondary Amine
SAX	Strong Anion Exchange
SDVB	Styrene-Di Vinyl Benzene
SFE	Supercritical Fluid Extraction
SPE	Solid Phase Extraction
UV	Ultraviolet
WHO	World Health Organization

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الخلاصة

في هذه الدراسة تم تقدير آني لمتبقيات السايبرمثرين و الفينفالريت في فاكهة الطماطم المزروعة في السودان في منطقة شرق الخرطوم بإستخدام جهاز كروماتوغرافيا الغاز المزود بمكشاف الإلكترونات.

الطريقة كانت خطية على مدى ٠,٠٧٥ - ٠,٠٠٩ ملجم/مللتر و ٠,٧٥ – ٠,٠٣٧ ملجم/مللتر لكل من السايبرمثرين و الفينفالريت على التوالي. وجد أنّ حدي الكشف و القياس الكمي هما ٠,٠٠٣، ٠,٠١ ملجم/مللتر و ٠,٠١٤، ٠,٠٤٧ ملجم/مللتر لكل من السايبرمثرين و الفينفالريت على التوالي.

كما وجد أنّ قيمتي الإسترجاع للسايبرمثرين و الفينفالريت من الطماطم المقواه هما ٩٧ % ± ٧,٥ و ٩٩,٥ % ± ١,٨ على التوالي.

أجريت دراسة حركية إضمحلال كلٌ من المبيدين و أدى التقييم النهائي لبينات الحركية الى وجود حركيات الرتبة الأولى بالنسبة لإضمحلالهما على فاكهة الطماطم. و من ثم قُدّمَ تبرير هذه النتائج.

أُجْرِي تحليل للتركيبة التجارية للمبيدين و أختبرت مذيبات مختلفة. فحصل على المستخلص الأكثر نقاوة و الأعلى قيم إسترجاع بإستخدام الهكسان الحلقي كمذيب تَجْزِئَة.

Abstract

In this study simultaneous determination of cypermethrin and fenvalerate residues in tomato fruit (*Lycopesicon esculentum*) grown in The Sudan, in Khartoum area, was carried out using gas chromatography with electron capture detector (GC-ECD).

The method was linear in the range of 0.075 – 0.009 mg/ml and 0.75 – 0.037 mg/ml for cypermethrin and fenvalerate respectively. The limit of detection (LOD) and limit of quantification (LOQ) were found to be 0.003, 0.01 mg/ml and 0.014, 0.047 mg/ml for cypermethrin and fenvalerate respectively.

The recoveries of cypermethrin and fenvalerate spiked to tomato were 97% ± 7.5 and 99.5 % ± 1.8, respectively.

The kinetic study of the degradation of both pesticides was performed and the ultimate evaluation of the kinetic data revealed a first order kinetics with respect to their degradation in tomato fruit and an explanation was put forward to account for the results.

Formulation of cypermethrin and fenvalerate were analyzed, different solvents were tested. The cleanest extract and the best recoveries were found using cyclohexane as partitioning solvent.